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Northwest San Francisco Rapid Transit Extension Study

Final Report Summary

Prepared for
BAY AREA RAPID TRANSIT DISTRICT
METROPOLITAN TRANSPORTATION COMMISSION
CITY AND COUNTY OF SAN FRANCISCO

AUGUST 1974

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SUMMARY EVALUATION

The evaluation of the concept alternatives was conducted by performing an analysis of both quantifiable and non-quantifiable features of each concept. Each alternative was then ranked against all other alternatives in the context of the Geary Corridor defined by a set of criteria and policy interactions.

POLICY FRAMEWORK

The first task of the program was to define a Policy Framework within which any transit program in the Geary Corridor would have to fit. Since transit and transportation influence most facets of urban life, the Policy Framework encompassed seven categories of concern: Regional Travel, Economics, Growth, Housing, Environmental Protection, Fiscal Factors, and Intracity Travel.

The initial set of policy statements was derived from analysis of adopted policies of governmental bodies at the local and regional levels. Sources included: Association of Bay Area Governments (ABAG) *Regional Plan, 1970:1990*; the Metropolitan Transportation Commission (MTC) provision policy document; and the San Francisco *Plan for Residence, Plan for Transportation,* and *Urban Design Plan.* This analysis was then refined through interviews with public and private organizations to determine the extent of support or opposition to positions contained in the official sources and to identify other views and issues to be addressed. As a final step, these policies and issues were presented and discussed at a public workshop of corridor area citizens in March 1973. The issues and commentary developed at that workshop were incorporated in the final statement of the Policy Framework.

While there are 56 separate entries in the Policy Framework, they may be summarized by the seven basic categories.

Regional Travel: A major focus of this study was to maximize accessibility of regional destinations throughout the Bay Area for corridor residents. This would aid in the reduction of total automobile usage and would provide greater mobility for all economic and social groups. Therefore, transit improvements in this corridor should foster an integrated regional and local transit system that would reduce dependency upon the private automobile by residents and visitors throughout the Bay Area.

Economic Considerations: The aims and objectives of this policy category recognized the economic impacts that a transit system can have on the residential and commercial areas through which it passes. Full consideration should be given to both short- and long-term potentially adverse and beneficial economic effects of any transit improvements.

Growth and Non-Growth Considerations: The growth-inducing effects of transit were examined, along with the need to achieve compatibility between these effects and the possibly conflicting neighborhood preservation policies. Transit improvement should be used as a means of directing and attracting future development in areas where growth is desirable, and, in turn, channeling development away from areas where further growth is objectionable. Therefore, it was among the purposes of the NWX Study to develop and select a transit system design for the Geary corridor that best channels future development in a manner consistent with San Francisco's *Urban Design Plan,* recent building height limits, and the Association of Bay Area Governments' *Regional Plan, 1970:1990.*

Housing Considerations: Housing and transportation are closely interrelated, particularly in terms of protecting residential neighborhoods from the intrusion of transportation-induced effects that might be detrimental to the livability of the areas and of promoting a transportation system that facilitates equitable distribution of housing at all income levels throughout the city, compatible with City Planning Commission objectives. It was the intent of this study to devise transit system improvements sensitive to such housing-related concerns.

Environmental Protection Considerations: A purpose of this study was to promote transit system solutions that would protect the area's natural resources, preserve notable man-made features, and enhance the overall quality of the urban environment. Prior to determining the recommended transit routes, facilities, and vehicles, the environmental protection aims should be fully considered, along with functional and fiscal factors.

Fiscal Factors: Generally, the aims and objectives in this policy category are to achieve transit system solutions that best fulfill the other objectives established in the Policy Framework and at the same time balance the construction and operating costs of the proposed transit with the benefits derived.

Intracity Travel Needs: A primary purpose of this study was to devise and select a system of transit improvements that would maximize the accessibility of citywide destinations for the study area residents. The service provided should also benefit employees, visitors, and other users of the businesses and institutions located throughout the corridor. These goals should be achieved in a manner most consistent with other policies outlined in the Policy Framework.

CRITERIA

Another major task in this study was the establishment of a criteria set that could be used to measure the effectiveness of each alternative, as compared to all others, in satisfying the statement of Policy Framework. The criteria for the NWX study were developed in four categories: Performance, Service, Interface, and Impact. These categories included 66 criteria, and comprised what the study team felt were all conceivable evaluations. As in the case of the policy statement, the criteria were developed through extensive interaction with the Citizen Advisory Committee and Task Review Group to ensure broad community agreement.

Performance Criteria: Criteria in the performance category dealt with the transit system itself. The system includes the vehicles, control and propulsion systems, track or guideway, and other elements of the transit system. These criteria were used to evaluate alternative transit systems entirely outside of any urban or environmental context. The evaluations within the urban or environmental contexts were made in other categories of criteria.

Service Criteria: Criteria in the service category were used to evaluate the interaction of transit system performance and user needs. Such criteria deal primarily with access points and compatibility with user requirements.

Interface Criteria: The use of interface criteria was helpful during the early phase of the study when alternative system components were being combined to form alternative whole transit systems. Criteria in this category pertain to the specific interactions alternative transit systems have with their immediate context or environment. Separating these criteria from the impact criteria enables a more definitive rating of alternative systems. For example, a bus system may have no cost for right-of-way acquisition or construction, but it may have an environmental impact. Conversely a tunneled rapid transit system may have a low right-of-way acquisition cost, a high construction cost, and no environmental impact. These differences are not entirely ascribable to either the transit system or to the urban context, but rather to the immediate relationship between the two—that is, their interface or coming together.

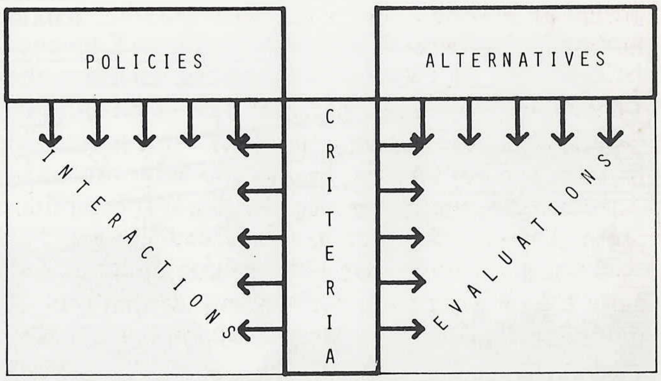
Impact Criteria: The impact criteria were based on recognition that the urban environment is composed of many highly-interrelated systems and the knowledge that a change in one system—i.e., transportation—can be expected to have effects on the other systems. These other systems include neighborhood patterns, utilities, community values, economic systems, and the environment. The impact criteria were designed to assess the changes that might be expected to result from various transit alternatives and to provide means to determine the degree to which the expected changes would be beneficial or detrimental.

EVALUATION PROCEDURE

With the Policy Framework and the Criteria established, the consultant team examined the community to be served in terms of development potential, growth areas, neighborhoods, land uses and character, and other factors influencing and influenced by transportation. At the same time, an examination was made of possible transit modes, linkages, terminal locations, guideway considerations, and other physical and operational elements of a transit service in the NWX corridor.

Through this process of matching urban features with the elements of the transit system, the five definitive concepts shown and described on the opposite side of this sheet were developed. These five concepts were then analyzed to provide the data required to evaluate each concept against the established criteria. The following diagram illustrates the application of policies, criteria, and analysis of alternatives to this process. This display makes it possible to identify not only the alternative having the most favorable overall evaluation and best supporting the Policy Framework, but also those that most strongly support any specific policy or set of policies.

SCHEMATIC EVALUATION MATRIX



THE POLICY/CRITERIA MATRIX

The Policy/Criteria Matrix shows the explicit and implicit relationships between the policy statements and criteria. The explicit relationships are those that are directly defined in a policy statement, while the implicit relationships are more indirect.

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ACKNOWLEDGEMENTS

CITIZEN'S ROLE

A special acknowledgment is due to the more than 300 corridor citizens who participated in the conduct of this study as members of the Citizens Advisory Committee and Task Review Groups. These people devoted many evening hours serving on committees and attending corridor meetings. Their critical review of proposals, ideas, and concepts was a significant influence in shaping not only the conclusions of the study, but the processes used to reach them. Moreover, their continued interest and constructive criticism will be an essential ingredient in future implementation of the conclusions and the adopted recommendations of the Board of Control that result from this study.

PARALLEL STUDIES

The cooperation of the Golden Gate Corridor Project Staff and their consultants is also gratefully acknowledged. The exchange of data with Kaiser Engineers and particularly the accessibility of planning and demographic material prepared for the Golden Gate study by Wallace, McHarg, Roberts & Todd greatly facilitated the conduct of this study.

PUBLIC AGENCIES

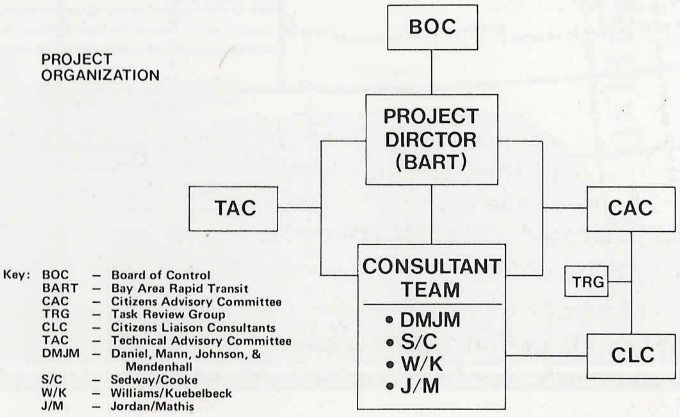
A Technical Advisory Committee made up of representatives of the technical staffs of the various public agencies affected by this project was formed to review all technical aspects of the study. The critique by and support of this committee were instrumental in a successful completion. Members and their represented agencies were: *James Finn*, San Francisco Municipal Railway (MUNI); *William Marconi*, San Francisco Department of Public Works; *Redmond Kernan*, San Francisco Redevelopment Agency; *James White*, San Francisco Department of City Planning; *Dallas John*, Metropolitan Transportation Commission (MTC); *Tito Sasaki*, *Peter Dison*, Golden Gate Bridge, Highway & Transportation District; *Steve Emerman*, Bay Area Rapid Transit District (BART); *Michael Kennedy*, U.S. Department of Transportation, Urban Mass Transportation Administration (UMTA); *Doug Cornell*, National Park Service.

In addition to these committee members, staff members from these agencies and departments rendered excellent cooperation and support in all phases of the project. Their participation is gratefully acknowledged as a major contribution.

THE STUDY TEAM

The conduct of this study represented a team effort, with the team consisting of the Board of Control, the consultants, a technical advisory group, and a citizens advisory body.

The Board of Control (BOC) was the decision-making part of the team and was composed of representatives from BART, the MTC commissioners, and the San Francisco Board of Supervisors. The BOC was responsible for consultant selection, approval of all work products and, ultimately, for reviewing the recommendations of the consultants in light of technical review and citizen reaction to adopt a project recommendation to be made to the appropriate implementing agency. The following diagram illustrates the team composition and interrelationships within the team.


PROJECT ORGANIZATION
BOC
PROJECT DIRCTOR (BART)
TAC
CAC
CONSULTANT TEAM
• DMJM
• S/C
• W/K
• J/M
TRG
CLC
Key: BOC – Board of Control
BART – Bay Area Rapid Transit
CAC – Citizens Advisory Committee
TRG – Task Review Group
CLC – Citizens Liaison Consultants
TAC – Technical Advisory Committee
DMJM – Daniel, Mann, Johnson, & Mendenhall
S/C – Sedway/Cooke
W/K – Williams/Kuebelbeck
J/M – Jordan/Mathis

There was one other indirect participant in this study process as well as in all other extension studies under way during this period. Rather than assign patronage estimating to each study consultant, BART/MTC made an allocation from the project funds for each of these corridor studies to the Regional Travel and Transportation Projection Project (RTTPP) to develop a regional patronage projection model. The transportation planning firm of Wilbur Smith and Associates was selected as RTTPP consultant under separate contract.

The purpose of the RTTPP was to provide coordinated revenue estimates and travel projections for the five corridor studies, including estimates and forecasts of future regional and intracity travel demand in the NWX corridor. Another purpose was to describe the effect of various transit alternatives for the NWX corridor on regional networks and the four other transit corridors. Both of these considerations have a direct bearing on the social utility and economic viability of any future transit system in the NWX corridor. Unfortunately, technical difficulties in model development prevented timely completion of that project and, therefore, reliable patronage estimates for the NWX project were unavailable.

THE STUDY PROCESS

The process used in the study progressed through several stages in working toward a conclusion. For simplicity and clarity, the process may be described as a series of sequential stages, although in the actual progress of the work elements of more than one stage might be under simultaneous development. Similarly, elements of an earlier stage might be undergoing reassessment or refinement.

Over a period of a year and a half, the consultant team worked with public officials, public agency representatives and technical staffs, residents of the study area, and other interested citizens. The intent was to open the planning process to a wide range of technical expertise, political acceptability, and community values to achieve a study team recommendation that would be sound, be feasible, and have broadly based community support. The identifiable stages of the process may be defined as follows:

Stage 1: Development of a Policy Framework to identify critical issues relative to development, transportation, and environmental interaction as a guide to transit improvement and development of a set of criteria to be used to evaluate the effectiveness of potential system improvements.

Stage 2: Definition and description of alternative transit system components, such as vehicle (mode), guideway, network, etc., that could be assembled into alternative transit systems.

Stage 3: Development of a series of preliminary transit improvement alternatives which, in whole or in part, represented the scope of possibilities in the corridor. These alternatives were subjected to an evaluation based on compliance with policy and criteria and on physical feasibility. This evaluation indicated the relative desirability of the alternatives and parts of the alternatives, from both a corridorwide basis and a segment-by-segment basis.

Stage 4: Grouping of alternatives by a combination of three factors—level of service, level of capital expenditure, and general configuration. Based on the evaluation described in Stage 3, alternatives that best represented their respective groups were identified. These were then combined, modified, and generalized to become the five alternative concepts recommended by the NWX team for further study. The Citizens and Technical Advisory Committees, by resolution, supported the recommendation and the Board of Control, on 11 November 1973, approved the five concepts for further refinement.

Stage 5: Concept refinements by the study team were approved for analysis and evaluation on 28 March 1974 by the Technical and Citizens Advisory Committees and the Board of Control.

Stage 6: The five concepts were subjected to analysis and evaluation, utilizing the 66 criteria developed in Stage 1 as a basis.

Stage 7: At the conclusion of the analysis and evaluation of the concepts, the study team made a presentation at a widely publicized Town Meeting held on 23 May 1974. The intent was to expose a wider public to the concepts and the study team's evaluation, and to obtain community response to both the concepts and the evaluation of the concepts. In view of the response at the Town Meeting, and based on the evaluation of the concepts utilizing the criteria and Policy Framework for the study, the consultant team prepared a draft summary evaluation and recommendation.

Stage 8: The evaluation and team recommendation were presented to the Technical and Citizens Advisory Committees on 18 June 1974 and to the Board of Control on 18 July 1974. This summary Final Report includes that recommendation, the public reaction to it, and the BOC response. The publication of this report also marks the conclusion of the technical study. From this point, the public and various public agencies will review the conclusions of this study and take action that is appropriate to their purposes.

FIVE CONCEPTS

VEHICLE SYSTEMS

For many people, the vehicle system and associated guideway requirements are the most important features of a transit system. In this study, a variety of potential vehicle systems were examined, ranging from the conventional bus through dual-mode vehicles to high-capacity, fixed guideway systems.

As a result of these examinations, the United States Light Rail Vehicle (dubbed "Muni Metro" in this study), scheduled for service on existing street railway routes and the Market Street subway in San Francisco, and a generic "bus" category were selected for further consideration. This decision was based on the following factors:

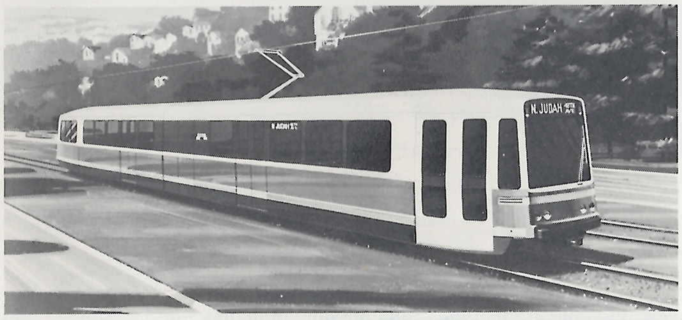
Fixed Guideway Systems: Primary candidates in this category included the BART system and the Muni Metro. The Muni Metro was recommended because:

- Its ability to operate at street grade as a street car offered greater flexibility than the BART system, which must be fully grade-separated.

- Its operating design characteristics fit highly urbanized conditions with frequent stops better than the high-speed BART system.
- Since extension into Marin County appears unlikely, the system will be entirely intracity and the potential exists for direct connection to the Market Street subway—a potential that could not be realized with the BART system.
- Either system can accommodate the passenger volumes expected.

Bus Systems: This general category included conventional buses, trolley buses, transbus (an UMTA-sponsored bus improvement research program), dual-mode systems (research vehicles capable of operating as a bus on city streets and coupling to form trains on a fixed guideway) and superbuses (larger double-deck or articulated vehicles common in European cities). After examination of these vehicle systems, it was recommended that a general generic "bus" mode be used rather than a specific vehicle type because:

- Although dual-mode systems are appealing, they are only in concept development stages.
- General service characteristics found among other vehicle types were similar.
- Passenger demand on individual lines would influence the size of bus and such data were not available.
- As improved bus vehicles became available, they could readily be substituted for existing equipment because the expected service life of a bus is substantially less than a fixed guideway vehicle and is, therefore, a less critical factor in initial selection.



GUIDEWAYS

Guideways, or the surface on which the transit vehicle operates, considered in this study ranged from surface systems on existing streets to fully grade-separated exclusive rights-of-way. Surface systems included various degrees of transit preference up to exclusive use of a given street by transit vehicles. Fully grade-separated guideways included both elevated and subway configurations.

The guideway examinations produced the following conclusions:

- Elevated guideways would produce too great a visual impact in this heavily urbanized corridor to be seriously considered further.
- Geary Boulevard offered the best opportunity of any street in the corridor for fully exclusive at-grade transit lanes because of its existing width and character of street frontage.
- Transit-preferential treatments offered the best opportunity for substantial upgrading of bus service in the corridor, but full dedication of any street in the corridor to "transit only" use would be extremely difficult to obtain and, therefore, should not be considered for general application.
- Ventilation requirements associated with internal combustion engines in a subway configuration were of sufficient magnitude to render this bus-subway combination unlikely, but all-electric or dual-mode vehicles (when and if available) could eliminate this constraint.
- In an electric bus subway, the station areas or bus stop locations would be the capacity-limiting factor, and since boarding/alighting projections associated with any given station or stop were unobtainable, no conclusive analysis of this combination could be made. It was necessarily, therefore, dropped from consideration.

The net result of the mode and guideway analysis established the following general concept parameters:

- Bus modes would operate on a surface guideway and could incorporate any transit-preferential treatment appropriate to the projected bus volume, service area characteristics, and available right-of-way.
- Muni Metro mode could operate in subway configuration or as a street car on the surface as appropriate for the anticipated train length and frequency, service area characteristics, and general traffic volumes. Transit-preferential treatments could also be applied to surface operations.

GENERAL CONCEPT DESCRIPTION

Through the study process, a wide range of alternatives was examined with successive and recursive refinement into five alternative concepts. These five concepts represent a broad range of cost/service/impact combinations. They also provide an opportunity to choose short- and long-range transit improvements in this corridor that optimize these three factors. At the same time, the concepts are not mutually exclusive. They are capable of staged implementation both internally within a concept or in a logical sequence leading from one concept to another of higher cost/service/impact magnitude.

In general, all five concepts emphasize east-west movement. This is a result of several factors.

- The western half of the corridor is constrained between two large regional park areas—Golden Gate Park and Presidio.
- Downtown San Francisco, the foremost activity center in the City and region, is at the east end of the corridor, which produces a dominant east-west travel pattern.
- Linkages to other sections of the City—the Marina district, the Sunset, Mission, etc.—while outside the scope of this study, are influenced more by available travel facilities over the ridge between the corridor and the Marina and through the Park to the Sunset district, for example, than by the system configuration within the corridor.

Therefore, all concepts incorporate approximately equivalent north-south or "cross-town" service to serve local intracorridor movement. This service may be expanded or reduced equally in any of the alternative concepts. It is significant, however, that in Concepts 3, 4, and 5, the cross-corridor service also has a "feeder" function to the east-west trunk system in Geary.

All concepts attempt to increase both the amount and quality of transit service in the corridor without removing service presently in existence. The principal variation is in the method by which the "improvement" is achieved, and each concept is likely to have differing impacts on service, induced development, environmental quality, etc., in addition to the obvious cost implications.

No concept will directly displace any residential, business, or institutional establishment, and all concepts are confined to use of existing public rights-of-way. Thus, no property acquisition by purchase or condemnation would be required. The following table presents some selected statistics estimated for each of the concepts.

Any of the concepts, to be successful, will require a strong policy stance by appropriate elected officials. In the case of Concept 2, for example, commitment to a transit-first policy of street use is likely to draw strong opposition from auto drivers and private vehicle interests. The opposition is likely to increase with each succeeding level of transit priority. In Concepts 3, 4, and 5, the extensive construction required will produce opposition on the basis of both traffic and business disruption, particularly with recent transit construction fresh in mind. This opposition is likely to increase with the increasing amount of construction in each concept.

Thus, while improved transit will enhance the area and the mobility of its residents, no one concept will be free of implementation problems. To assess more fully both positive and negative implications of these concepts, each was subjected to an evaluation procedure.

SELECTED STATISTICS AND ESTIMATES

ITEM	1971	1990				
	EXIST MUNI	CONCEPT 1	CONCEPT 2	CONCEPT 3	CONCEPT 4	CONCEPT 5
ESTIMATED PASS.[1]	60,000	70-80,000	80-90,000	90-100,000	110-120,000	110-120,000
NO. VEHICLES						
Motor Coaches	162	238	249	183	136	157
Trolley Coaches	108	130	133	140	162	175
Muni-Metro	—	—	—	54	108	105
ANNUAL OPERATING COST (millions $)	14.8	20.0	21.1	22.1	26.8	27.4
CAPITAL COST[2] (millions $)	16.5	22.1	22.9	39.5	58.1	59.1
CONSTRUCTION COST[3] (millions $)	—	—	1.8	172.1	394.7	314.4
ANNUAL EQUIV. COST[4] (millions $)						
Capital	1.3	1.7	1.8	2.1	2.6	2.7
Const.	—	—	.5	3.8	8.1	6.5
Total	1.3	1.7	2.3	5.9	10.7	9.2
ANNUAL COST/PASS.[5]	.87	.88-1.00	.84-.95	.90-1.00	1.01-1.10	.98-1.07

1) 24 HOUR VOLUME CROSSING VAN NESS SCREEN LINE ON AVERAGE WEEKDAY 1990
2) INITIAL COST FOR ROLLING STOCK AT 1974 PRICES IN MILLIONS OF $
3) TOTAL CONSTRUCTION COST AT 1974 PRICES IN MILLIONS OF $
4) TOTAL COST DIVIDED BY EXPECTED LIFE OF EACH ITEM
5) SUM OF ANNUAL OPERATING COST + ANNUAL EQUIV. CAPITAL & CONSTRUCTION COST DIVIDED BY PASSENGERS

IMPACT SUMMARY

Concept 1: Projected increases in travel demand over the next 20 years, even with modest overall growth in the corridor, may be expected to increase crowding on the buses and produce a general increase in traffic with consequent increases in air pollution, noise, and traffic congestion. The marginal improvements made in transit in this concept should not be expected to attract significant numbers of commuters, a situation that will also lead to increased automobile-related impacts. The general consequences expected are long-term negative impacts on residential areas. Downtown street capacity places a limit on the ultimate capacity of this concept.

Concept 2: As in Concept 1, Downtown street capacity for bus circulation places an upper limit on this system capacity. Concept 2, however, would provide general service improvement with reduced trip times for both local trips and trips from the outer corridor. Travel from the outer corridor to the Downtown would take less than 30 minutes. Conflicts with other surface traffic would be minimized through the use of transit-preferential streets. The corridor could be sectored with peak period service originating in each sector to ensure uniform quality of service throughout, resulting in significant improvements in service to areas such as the Western Addition.

Minor construction disruption would take place in order to incorporate transit-preferential treatment. Some initial confusion might be expected, due to change in traffic patterns for both buses and auto traffic. Heavier bus traffic would be expected on transit-preferential streets, accompanied by reduced auto traffic. Some diversion of auto traffic to parallel streets is possible. Some bus routes might be consolidated to operate on preferential streets. This concept has a higher potential for attracting automobile commuters through transit improvement. On balance, neighborhood environment and neighborhood stability would be moderately improved.

Concept 3: Increased short-term disruption would be produced in Concept 3 because of the construction of the exclusive right-of-way and subway in Geary. To minimize such disruption, all subway portions (except at stations) would be constructed by tunnel methods. Subway station construction would require rerouting traffic during initial stages (two to four months), after which traffic would generally resume normal operation on decking over the subway excavation. Exclusive surface lanes in the Geary median could require closing selected cross street intersections to permit trained vehicles, which would lead to increased traffic on available cross streets. The concept might induce a limited amount of new development confined to properties adjacent to Geary in the immediate vicinity of the subway stations. In no case is new development expected to conflict with the city's Zoning and Height-and-Bulk ordinances.

Concept 4: Concept 4 entails the greatest construction period disruption because of more subway stations and required surface improvements to California, Geary, and Balboa. Disruption at subway station constructtion sites would be similar to Concept 3 subway construction. This concept, along with Concept 5, is expected to produce the maximum diversion from automobile commuting to transit, with resulting improvement in traffic-generated impacts. This concept may be expected to induce a limited amount of new development, chiefly from Masonic east, but including areas along Geary at Arguello and Seventh and Eighth Avenues. The degree and nature of this development would be moderate, however, and within the limits of the city's current ordinances. This concept, together with Concept 5, would offer the maximum opportunity to structure any new development in the corridor by relating to station development and high-capacity transit corridor.

Concept 5: Construction disruption would be greater than in Concept 3 but less than in 4. Subway station construction process would be as in Concepts 3 and 4. As in Concept 4, maximum diversion to transit for commuting trips in the corridor would be expected, along with a limited amount of new development along Geary in the vicinity of some subway stations. New development would be most likely east of Masonic, although areas along Geary at Arguello and between Seventh and Eighth Avenues would be attractive to new development. New development is expected in all cases to fall within the limits of the existing Zoning and Height-and-Bulk ordinances. This concept offers the same structuring opportunities for new development, but focuses even more on Geary. If combined with a demand-responsive feeder system, Concept 5 would produce the highest service level of all concepts for both local and intracorridor travel. Also, Concept 5 would offer the widest range of system capacity of all concepts.

These general findings, along with high general policy compliance, would indicate that Concept 4 or 5 would be the best long-range transit improvement.

It should be clearly pointed out, however, that this conclusion represents an unweighted evaluation of the criteria and does not directly include cost-effectiveness considerations related solely to potential transportation improvement.

Concepts

CONCEPT 1: THE EXISTING MUNI SYSTEM

Description

Concept 1, Existing Muni, is a basis for comparing and measuring the performance of the other concepts. It also represents the "no project" alternative for the ultimate Environmental Impact Analysis report.

Concept 1 utilized standard motor and trolley coaches. Annual operating cost is estimated at $20 million with annualized capital cost of $1.7 million (1974 cost levels). Patronage is estimated to be between 70,000 and 80,000 daily passengers crossing Van Ness in 1990.

CONCEPT 2: AN IMPROVED BUS SYSTEM

Description

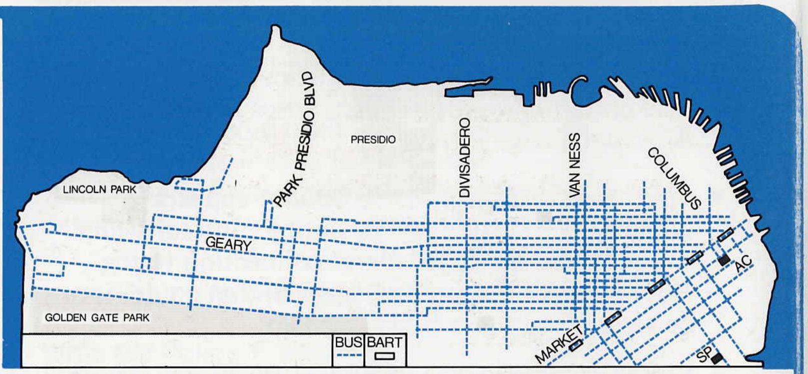
Concept 2 employes an all-bus/trolley system with heavy emphasis on transit-preferential streets. It includes the transit-preferential streets recently adopted in the Downtown and extends the concept throughout the corridor, including some important north-south routes. On these streets, the flow of buses would be improved by a combination of measures that range from simply limiting on-street parking, through bus-actuated traffic signals, to dedication of special lanes or whole streets to exclusive transit use.

Concept 2 entails complete modernization of the bus/trolley fleet. Annual operating cost is estimated at $21.1 million with annualized capital and construction cost of $2.3 million (1974 cost level). Patronage is estimated between 80,000 and 90,000 daily passengers crossing Van Ness in 1990. Development time is estimated at one to three years, though a longer period would be required for total fleet replacement.

CONCEPT 3: MUNI-METRO SURFACE CAR/ SUBWAY IN GEARY

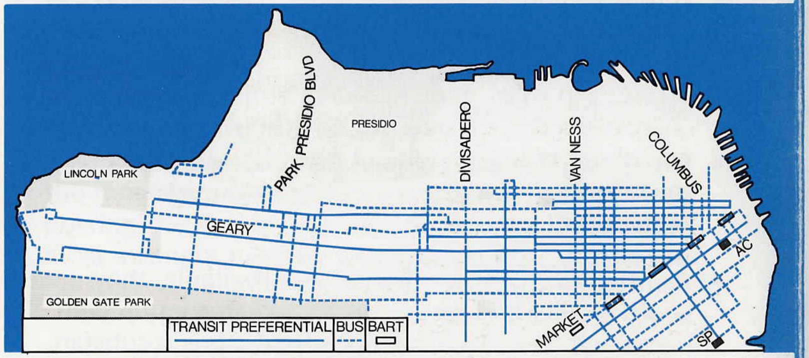
Description

Concept 3 retains the transit-preferential emphasis from Concept 2 but substitutes light rail (Muni-Metro) service in Geary Boulevard, operating in exclusive lanes with full grade separation at Masonic and from Cathedral Hill through Downtown. Extends service



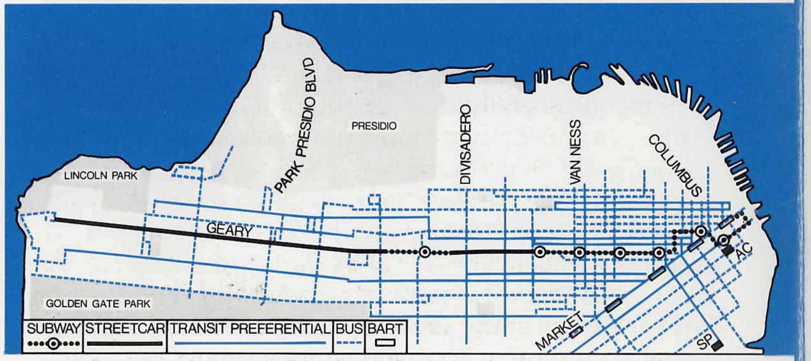
Service

Concept 1 provides relatively slow service except for some areas that receive express service. Travel from the outer corridor to the Downtown takes between 40 and 50 minutes. Service is often irregular; there are poor connections to regional terminals. This system is highly vulnerable to disruption due to traffic congestion.



Service

Concept 2 would provide general service improvement with reduced trip times for both local trips and trips from the outer corridor. From the outer corridor to the Downtown would take less than 30 minutes. Conflicts with other surface traffic would be reduced and minimized through the use of transit-preferential streets. The corridor would be sectored, with peak period service originating in each sector to ensure uniform quality of service throughout and bringing significant improvements in service to areas such as the Western Addition.



Service

direct to Transbay Terminal and provides connection to Market Street Subway. System could be extended south through Yerba Buena and on to Candlestick Park if desired. Vehicles include modernized bus/trolley fleet plus Muni-Metro cars. Annual operating cost estimated at $22.1 million with annualized construction and capital cost of $5.9 million (1974 cost levels). Patronage estimated between 90,000 and 100,000 daily passengers crossing Van Ness in 1990. Development time estimated at five to eight years.

CONCEPT 4: GEARY SUBWAY WITH RICHMOND SURFACE CARS

Description

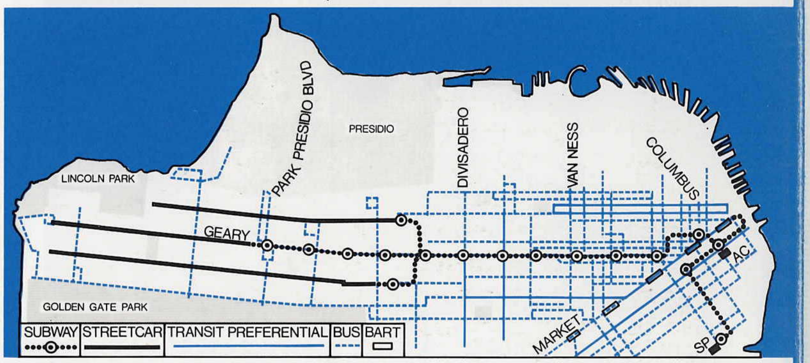
Retains transit-preferential bus treatments east of Masonic but substitutes surface rail lines in California and Balboa as well as Geary, as in Concept 3. Geary rail line enters subway at 17th Avenue with California and Balboa lines merging at Masonic. Direct connection to Muni Market Street subway and extension to Transbay Terminal, Yerba Buena, and SP Terminal. Could extend south to Candlestick in Third Street Corridor. Could accommodate Golden Gate Transit transfers at Park Presidio. Vehicles include modernized bus/trolley fleet plus Muni Metro cars. Annual operating cost estimated at $26.8 million with annualized capital and construction cost at $10.7 million (1974 price levels). Patronage estimated to be between 118,000 and 120,000 daily passengers crossing Van Ness in 1990 excluding Golden Gate transfers. Development time estimated at five to ten years.

CONCEPT 5: GEARY SURFACE CAR AND SUBWAY FROM 17TH AVENUE

Description

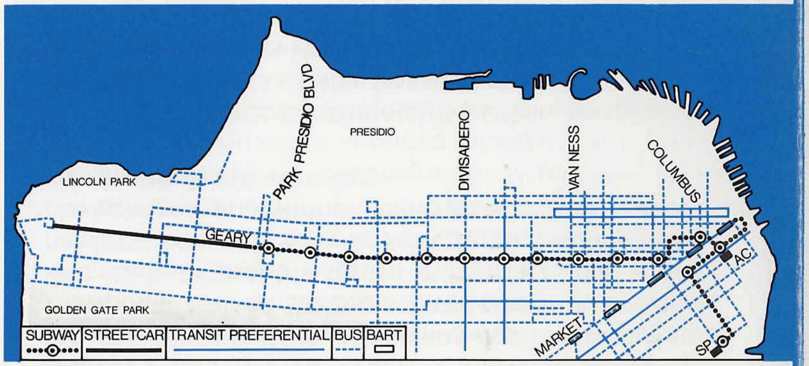
Same as Concept 4 except surface rail lines in California and Balboa omitted. Extensive feeder system provides local service and access to Geary rail lines. Same Downtown options as Concept 4. Includes transfer potential with Golden Gate Transit at Park Presidio. Vehicles include modernized bus/trolley fleet plus Muni-Metro cars. Feeder and local system in outer corridor could be demand-responsive (Dial-a-Ride) with smaller buses. Annual operating cost estimated at $27.4 million with annualized capital and construction cost of $9.2 million. Patronage estimated between 110,000 and 120,000 daily passengers across Van Ness *excluding* Golden Gate transfers. Development time five to ten years.

Improved service and reduced trip time. Trip from the outer corridor to Downtown would take less than 25 minutes. Improved dependability because of reduced susceptibility to traffic congestion, particularly on exclusive Geary route. As in Concept 2, sectored service on bus routes would originate buses in each sector (such as the Western Addition), providing improved local service. Improved citywide and regional service would result from direct subway interconnections with the Muni/BART lines in Market Street and the station at the Transbay Terminal.



Service

Expanded "single-seat," or no-transfer, service provided between the Richmond and Downtown or other corridor destinations. Trip time between the outer corridor and the Downtown between 20 and 25 minutes. Service dependability increased. Bus service originating in the Western Addition would provide improved local, citywide and regional service. Improved connections to the regional transit systems.



Service

Trip time between outer corridor and Downtown approximately 21 minutes and very dependable. Local service would be improved through the addition of extensive feeder system. Improved service to the Western Addition and other inner corridor areas would result from buses originating at mid-corridor and from the transit-preferential treatment of McAllister and Sacramento-Clay. Improved citywide and regional service would result from the direct subway connections to regional transportation systems.

CITIZEN CONCERNS

The overriding citizen concern voiced in the extensive citizen participation program of this study was that induced growth in this corridor be held to an absolute minimum. While the economic analysis conducted indicated that the transit system would not be a major factor in attracting growth to the corridor, it also found that Concepts 4 and 5 would produce the greatest transit-induced growth pressure, at whatever level, of all concepts. This concern, coupled with the total cost of Concepts 4 and 5, prompted a strong endorsement of Concept 2 by the great majority of corridor citizens, who place a very high weight on maintaining the present residential character of the corridor, particularly in the Richmond district.

COST EFFECTIVENESS CONSIDERATIONS

While the matrix evaluation indicates a high general compliance with the overall policies directing the transit improvement in the corridor, an examination of those criteria dealing with quantified costs and estimated service and patronage reveals that Concept 2 produces the greatest *potential* incremental increase in transit improvement per dollar expended. Criteria considered include: 1.1, operating cost; 1.2, capital cost; 1.3, speed; 1.4, capacity; 3.2, construction cost; and 3.5, patronage.

In the following table, the actual numerical results of the analysis of each system for those specific criteria have been used. The numerical values determined were expressed in the following terms:

- Operating Cost – per passenger estimated crossing Van Ness
- Capital Cost – annualized cost of rolling stock
- Speed – average travel time in minutes
- Capacity – maximum capacity of the concept system crossing Van Ness Avenue
- Construction Cost – annualized cost of physical construction required
- Patronage – estimated daily passengers expressed as passengers crossing Van Ness Avenue.

These values have then been "normalized" so that the "best" concept (i.e., the one with the fastest travel time, least cost, highest patronage, etc.) received a value of 1.0, with all others receiving a higher value in proportion to the actual numerical results of the analysis. The results are shown in the following table.

COST-EFFECTIVENESS CONSIDERATION

	Concept (Normalized Value)				
Criterion	**1**	**2**	**3**	**4**	**5**
Operating Cost	1.17	1.08	1.01	1.00	1.03
Capital Cost	1.00	1.06	1.24	1.53	1.59
Speed	1.29	1.10	1.11	1.09	1.00
Capacity	1.53	1.45	1.08	1.00	1.00
Construction Cost	–	1.00	7.60	16.20	13.00
Patronage	1.53	1.35	1.21	1.00	1.00

Examination of the cost-effectiveness table clearly shows that while Concepts 4 and 5 are superior in speed, capacity, and patronage and are nearly equal in operating cost, large construction costs are necessary to achieve the results. On this basis, Concept 2, with a modest annualized construction cost, offers the greatest potential incremental improvement in transit service per dollar.

It should be pointed out, however, that the service improvement would be contingent on acceptance by the community, the public agencies, and the policy bodies of a high degree of transit preference. Some of these measures might be expected to receive strong opposition due to loss of curb parking and other restrictions on automobile movements.

UNRESOLVED ISSUES

The analysis of the concepts also brought several unresolved issues into focus, some of which will have bearing on the ultimate transit program in this corridor. Included are:

- Resolution of the Golden Gate Transit program relative to the potential for transfer to the NWX system somewhere in this corridor.
- Resolution of regional transit issues relative to transit linkages to San Mateo and Santa Clara Counties with the attendant impacts on the Transbay Terminal and the SP station.
- Operational characteristics of the Muni-Metro Market Street subway service with the merge requirements of the branch lines in the southern portions of the city, which may influence the feasibility or desirability of an operational connection to any Geary corridor subway.
- Conflict in regional priorities for expenditure of public funds in long-range transit improvements between the NWX and all other areas with competing programs.

These factors, together with the operational analysis and evaluation of the concepts have been considered in arriving at the consultant team recommendations.

CONSULTANT TEAM RECOMMENDATION

The consultant team recommendation is based on:

- Several months of comprehensive examination of the corridor and its potentials and of appropriate transit system elements and development of a realistic range of attainable concept alternatives
- Two months of intensive analysis and evaluation of the five resulting concepts, utilizing the criteria defined in the study process
- The degree of compliance exhibited by each concept with the goals and objectives defined by the adopted Policy Framework
- Continuing citizen participation, review, and critique of all phases of the work, together with public agency review and comment.

RECOMMENDATIONS

Evaluation of the existing transit service in the corridor as represented by Concept 1 reveals need for significant improvement if the current high quality life style and environment in the corridor is to be maintained. Travel time must be improved to enhance the attractiveness of transit as an alternative to the private auto; capacity and quality of service in the mid-corridor and inner residential sections of the corridor must be improved; and connections to other regional transit service should be broadened and made more convenient. The consultant team believes that implementation of this study's recommendations can attain these objectives.

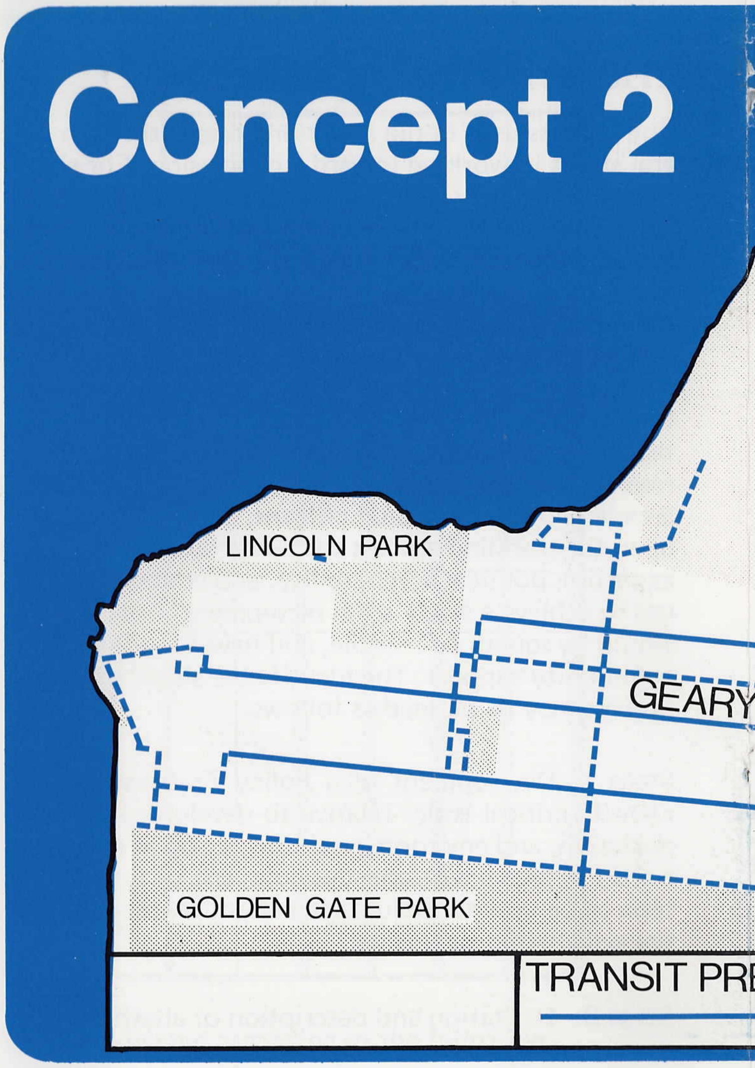
The recommendation is essentially in two parts:

One: Aggressively pursue Concept 2 as an immediate transit improvement program through detailed planning, design, and definition of the implementation program.

Two: Include Concept 5 as a part of the Regional Transportation Plan as a potential long-range transit improvement program, pending decisions on the unresolved issues described in this study.

DISCUSSION

It is very clear that after active participation through all phases of this study and careful consideration of all technical analysis and evaluation of the concepts, the great majority of those corridor citizens constituting the Citizens Advisory Committee and those attending the workshops and public meetings strongly favor Concept 2 and are very concerned about the growth-inducing potential of Concepts 4 and 5. If active community participation, upon which the precepts of this study were founded, is to have real meaning, those wishes and concerns must be recognized.



These factors are the basis of the recommendation for inclusion of Concept 5 in the long-range transit program for the region, pending only:

- Decisions on the unresolved issues bearing on its detail planning and ultimate priority
- The extent to which Concept 2 can be implemented and its resulting actual performance.

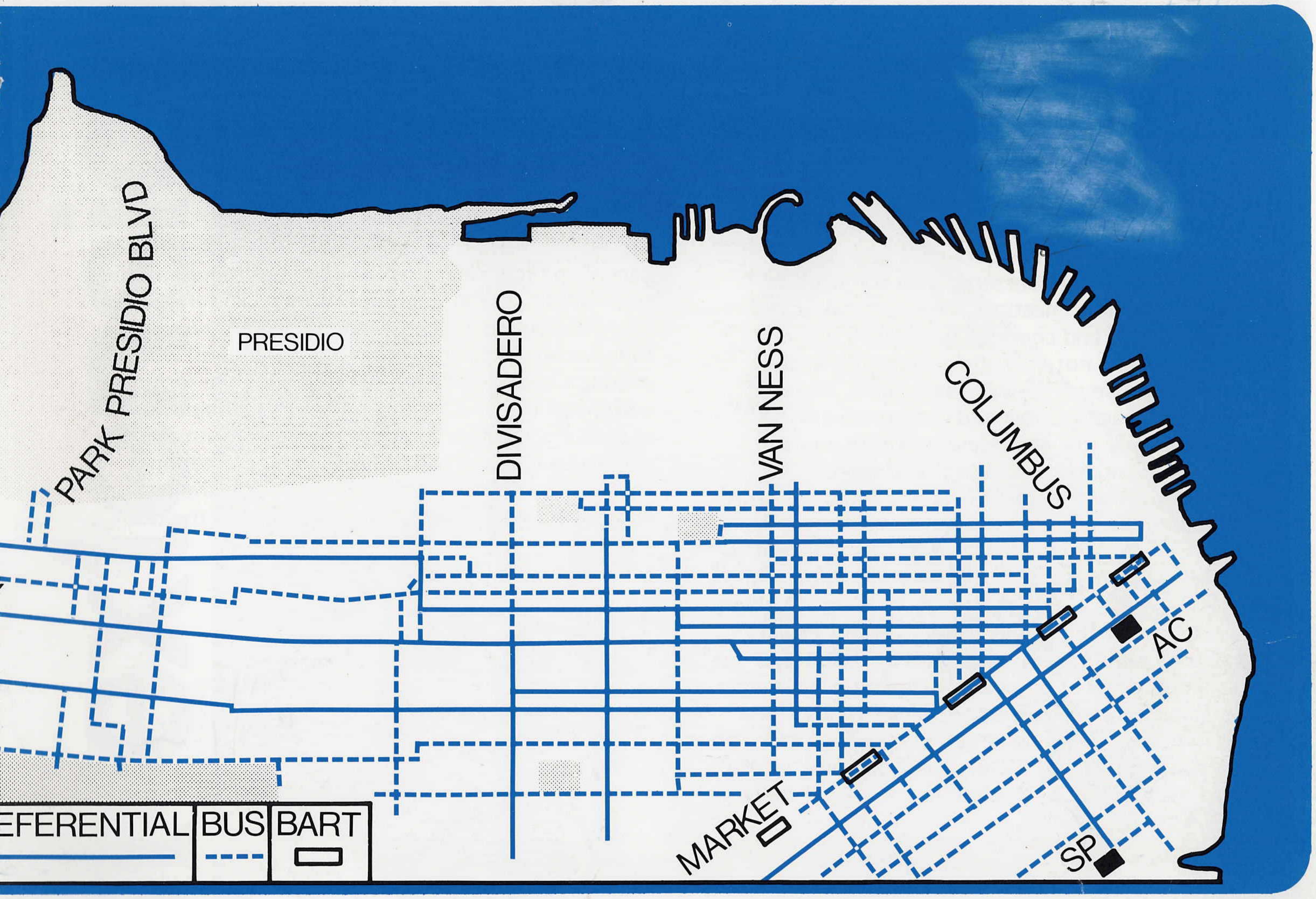
This recommendation would result in transit improvements that provide the highest compliance to the policies and criteria for the study. Specifically, this recommendation is viewed as providing the maximum benefits to the corridor, city, and region.

Corridor Benefits:

- Environmental impacts would be minimized.
- With the inclusion of the Golden Gate transfer, the "hide and ride" problem would be minimized.
- The transit system would offer the comfort, capacity, and speed required to attract outer corridor automobile commuters.

Citywide Benefits:

- Reduction of dependence on the automobile for primary travel would reduce environmental impacts



Citizens Response

The citizens of the Northwest (Geary) corridor can take pride in their involvement in this study and satisfaction in its outcome. Over three hundred of us participated, and many spent long hours working with the project staff, consultants and Board of Control at every stage of this study project. The study attempted to address several critical issues regarding public transportation in this corridor:

- Is the existing or an improved bus system adequate to serve the needs of this corridor over the next 20 years?
- Should some form of rail transit such as BART or Muni Metro be built in the corridor?
- What impacts will these alternative systems have on the environment and our neighborhoods?

The choices narrowed down to essentially two — significantly improve the existing bus system by giving greater preference to transit on the existing streets or to begin planning and implementation for extension of the Muni-Metro rail system out Geary Boulevard.

The Citizens Advisory Committee strongly urged the Board of Control to reject the Muni-Metro concept as being neither justified nor compatible with the residential scale of this area of San Francisco.

It is hoped that as a result of this study planning will proceed as soon as possible on improvements to existing bus services.

Peter McCrea
Chairman Citizens Advisory Committee

That factor, plus the apparent cost-effectiveness considerations of a potentially significant improvement in transit service at a comparably modest cost identified in the technical analysis of the concepts, dictates that Concept 2 be aggressively pursued and maximum effort given to its full implementation and opportunity for success.

In addition, the consultant team finds Concept 2 to have long-term application and benefit when integrated into long-term transit improvements for the corridor, even if a higher order system is ultimately required. These include the maintenance of transit-preferential status of appropriate streets in the corridor and the utilization of new buses for feeder service and expanded cross-town service. In essence, implementation of Concept 2 in no way precludes upgrading the corridor systems in the future if necessary or desirable; hence the recommendation for immediate action on Concept 2.

The consultant team also finds, however, through a serious and intensive effort at objective evaluation of the concepts in light of the overall Policy Framework, that Concept 5 performs significantly better in long-term attainment of the primary objectives identified. For example, when compared to Concept 5, the study team finds that Concept 2 could do little to improve environmental quality and may actually produce negative impacts in the neighborhoods of the Western Addition and the Downtown residential areas by increased express bus traffic through the areas; Concept 2 would make no significant contribution toward reduced use of the automobile in the corridor; Concept 2 will not significantly benefit Downtown traffic congestion where capacity for on-street circulation required for corridor buses will ultimately limit the capacity of the Concept 2 system; and Concept 2 will not solve the "hide and ride" problems associated with residents from outside the corridor using the corridor transit system. While no conclusive supporting evidence has been developed, the consultant team believes that transit-preferential treatment for express buses from Marin County across Golden Gate Bridge, coupled with convenient transfer to a fully grade-separated system in the NWX corridor, would offer an attractive "all-transit" option that would reduce the "hide and ride" problem.

In addition, implementation of Concept 2 preferential treatments will be extremely difficult in the areas east of Van Ness Avenue where it is most critical for the success of Concept 2 performance. This stems from physical constraints imposed by narrow streets and probable resistance from the business community and traffic management agencies to potential restriction of automobile movements imposed by transit-preferential measures.

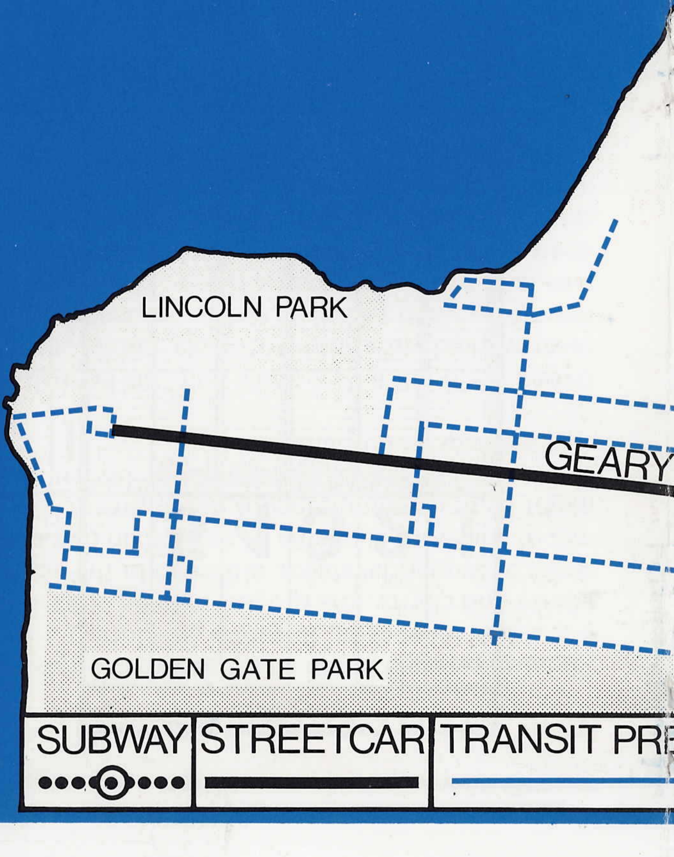
primary travel would reduce environmental impacts throughout the city.

- Access of corridor residents to facilities and opportunities throughout the city would increase opportunities for corridor residents. Conversely, access of city residents to corridor facilities would enhance the viability of these facilities. In both cases, the city would benefit from increased viability of its facilities, institutions, and employment centers.
- The city as a whole would benefit from a transfer of Golden Gate transit patrons to the NWX Muni-Metro by reduction of the impact of Golden Gate buses on the surface of the city.

Regional Benefits:

- The effectiveness of the regional transit systems (Golden Gate, BART, AC Transit, Greyhound) would be increased by provision of an important interconnection providing access to the important facilities and institutions in the mid- and east-Geary corridor.
- Dependence on automobile travel would be reduced, along with its concomitant environmental impacts.
- Regional expendutures for a high level of transit service might be reduced through shared use of facilities.

Concept 5



Board Action

On December 10, 1974 the Board of Control for this project adopted a motion to reject Concepts 1, 3, 4 and 5 and to vigorously pursue the implementation of Concept 2. This decision was based upon careful consideration of all the recommendations of the Consultant and comments of the project staff, technical advisory committee and the citizens, all of whom spent considerable time and effort during this study process.

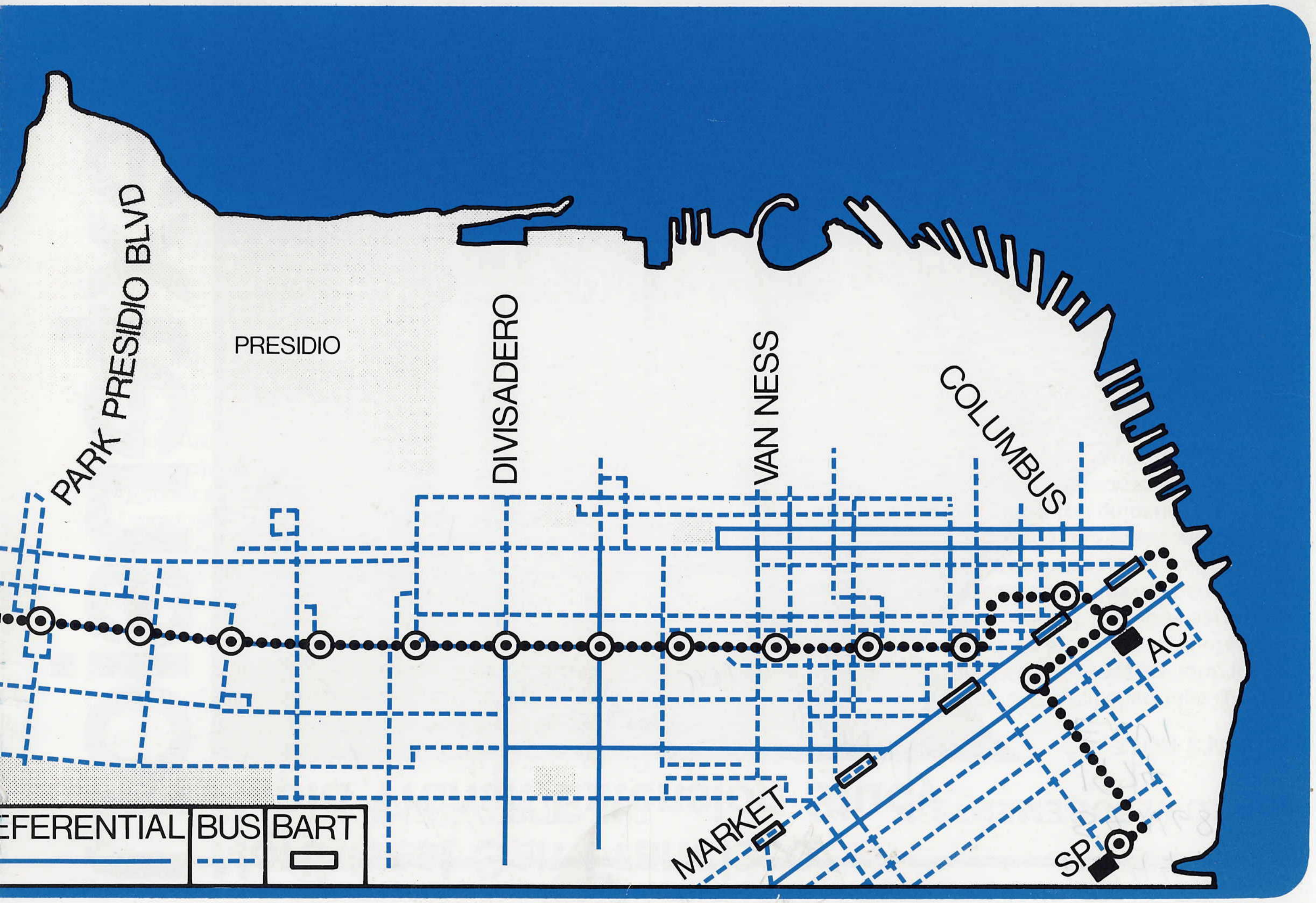
The recommendation to pursue implementation of Concept 2, the extension of preferential treatment to transit on the major east-west streets serving the corridor, is based on the need and desire for significant improvements in this corridor.

The Board believes that there remain too many unknowns regarding impact and need to recommend a major capital improvement such as a Muni-Metro system. Concept 2 can be implemented at a relatively low capital cost and should yield substantial benefits for the citizens of the corridor and the region as a whole.

The NWX Board urges the constituent agencies to take all possible actions to endorse and implement the recommendations of this project.

On behalf of all members of the Board, I extend our appreciation for the efforts of all the participants in this project.

John C. Crowley
Chairman



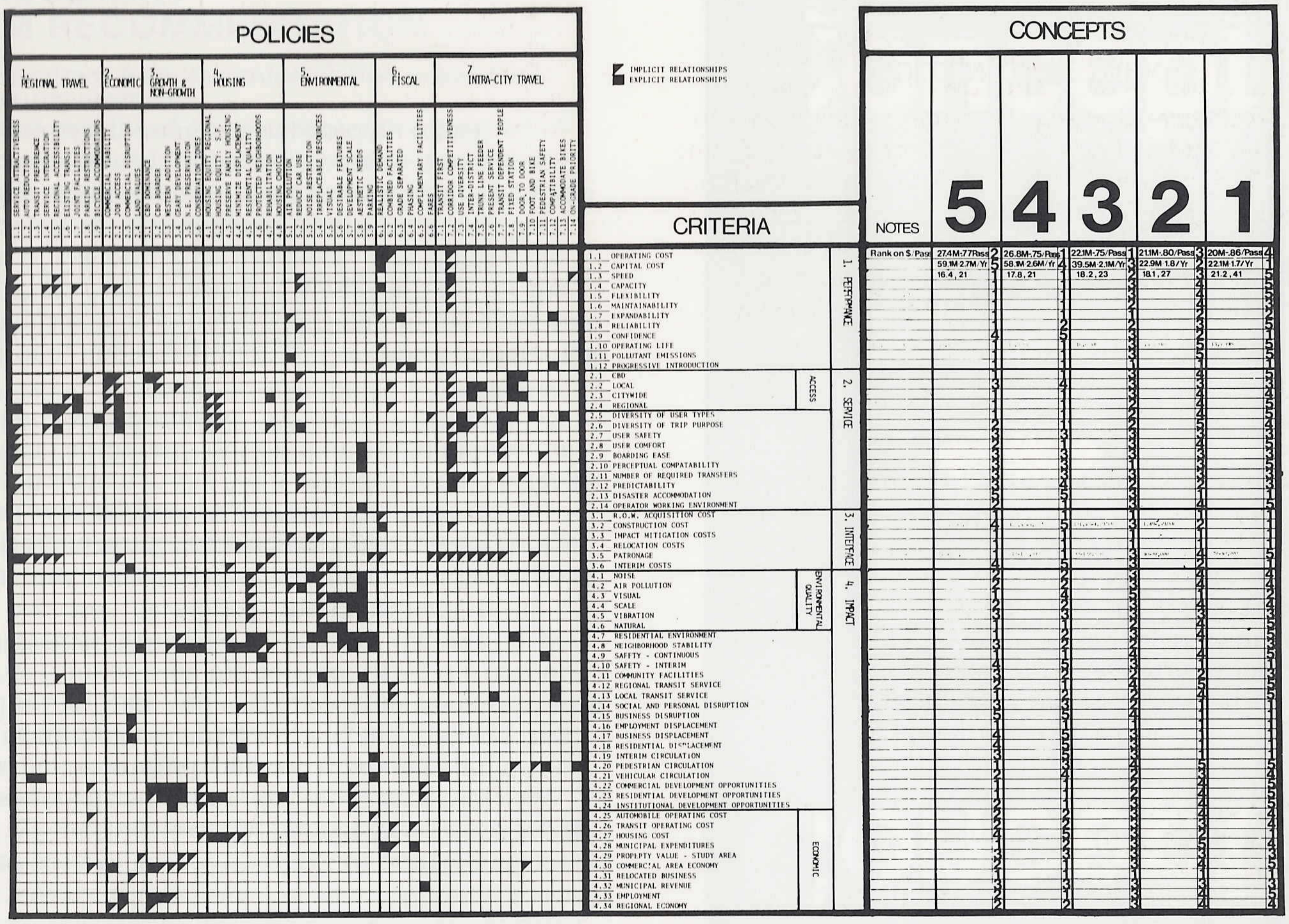

POLICIES
1. Regional Travel
2. Economic
3. Growth & Non-Growth
4. Housing
5. Environmental
6. Fiscal
7. Intra-City Travel
Implicit relationships
Explicit relationships
CONCEPTS
NOTES
5
4
3
2
1
CRITERIA
1. Performance
2. Service
Access
3. Interface
4. Impact
Environmental Quality
Economic
1.1 Operating cost
1.2 Capital cost
1.3 Speed
1.4 Capacity
1.5 Flexibility
1.6 Maintainability
1.7 Expandability
1.8 Reliability
1.9 Confidence
1.10 Operating life
1.11 Pollutant emissions
1.12 Progressive introduction
2.1 CBD
2.2 Local
2.3 Citywide
2.4 Regional
2.5 Diversity of user types
2.6 Diversity of trip purpose
2.7 User safety
2.8 User comfort
2.9 Boarding ease
2.10 Perceptual compatability
2.11 Number of required transfers
2.12 Predictability
2.13 Disaster accommodation
2.14 Operator working environment
3.1 R.O.W. acquisition cost
3.2 Construction cost
3.3 Impact mitigation costs
3.4 Relocation costs
3.5 Patronage
3.6 Interim costs
4.1 Noise
4.2 Air pollution
4.3 Visual
4.4 Scale
4.5 Vibration
4.6 Natural
4.7 Residential environment
4.8 Neighborhood stability
4.9 Safety - continuous
4.10 Safety - interim
4.11 Community facilities
4.12 Regional transit service
4.13 Local transit service
4.14 Social and personal disruption
4.15 Business disruption
4.16 Employment displacement
4.17 Business displacement
4.18 Residential displacement
4.19 Interim circulation
4.20 Pedestrian circulation
4.21 Vehicular circulation
4.22 Commercial development opportunities
4.23 Residential development opportunities
4.24 Institutional development opportunities
4.25 Automobile operating cost
4.26 Transit operating cost
4.27 Housing cost
4.28 Municipal expenditures
4.29 Property value - study area
4.30 Commercial area economy
4.31 Relocated business
4.32 Municipal revenue
4.33 Employment
4.34 Regional economy
Rank on $ Pass
27.4M-77/Pass
59.1M 2.7M/Yr
16.4, 21
26.8M-75/Pass
58.1M 2.6M/Yr
17.8, 21
22.1M-75/Pass
39.5M 2.1M/Yr
18.2, 23
21.1M-80/Pass
22.9M 1.8/Yr
18.1, 27
20M-86/Pass
22.1M 1.7/Yr
21.2, 41

FIGURE 1
NWX CONCEPT/POLICY/CRITERIA MATRIX

Detailed discussion of each analysis and the resulting evaluation are contained in Section 8 of the technical Final Report, and the results are shown in Figure 1 of this summary. However, for purposes of a summary evaluation it is necessary to focus on those criteria having a high degree of interaction with the policy groupings and on how the concepts comply with the Policy Framework.

Accordingly, from the matrix the policy/criteria groups with strong interaction have been defined and listed in the Summary Compliance Table, following. The degree to which each concept supports a policy group has been determined by taking its relative ranking in each criterion identified for each policy group and determining an average ranking for that policy grouping. The degree of support (compliance with policy) is indicated according to the following schedule:

Average Rank	Implied Degree of Compliance	Symbol
Below 2	High	H
2 to below 2.5	Medium High	MH
2.5 to 3.5	Medium	M
Over 3.5 to 4	Medium Low	ML
Over 4	Low	L

This table indicates that Concepts 4 and 5 produce the highest degree of general compliance with the Policy Framework based on the unweighted results of the evaluation matrix. This general conclusion is reinforced by a broad summary of the generalized impacts to be expected from each concept which may be summarized as discussed on the reverse side of this sheet.

SUMMARY COMPLIANCE TABLE

Policy Group	Interacting Criteria	Concept 1	2	3	4	5
1. Regional Travel	2.1-2.6, 4.12, 4.13	L	ML	M	H	H
2. Economic	2.1-2.6, 4.30-4.34	ML	ML	M	H	H
3. Growth and Non-Growth	2.1, 2.2, 4.22, 4.23, 4.30, 4.33	L	ML	M	H	H
4. Housing	2.3, 2.4, 4.7, 4.8, 4.23, 4.27	ML	M	M	MH	H
5. Environmental	4.1-4.8	ML	M	M	MH	H
6. Fiscal	4.26, 4.28, 4.32	ML	ML	M	MH	MH
7. Intracity Travel	2.1-2.12	L	M	M	MH	MH